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# वायु-आकाशीय — ढिबरियाँ — रूप और स्थिति संबंधी छूटें

*Indian Standard*

# AEROSPACE — NUTS — TOLERANCES OF FORM AND POSITION

ICS 49.030.30

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*September* 2002

**Price Group 5**

Aircraft and Space Vehicles Sectional Committee, TED 14

## FOREWORD

This Indian Standard was adopted by Bureau of Indian Standards, after the draft finalized by the Aircraft and Space Vehicles Sectional Committee had been approved by the Transport Engineering Division Council.

This standard is one in the series of Indian standards developed for aerospace fasteners and is based on the International Standard ISO 8788 : 2000 'Aerospace — Nuts, metric — Tolerances of form and position'.

Only one type of product from all possible forms has been used as an example but the features of tolerancing has been specified in a typical way that has also been extended to other forms.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the results of a test or analysis made in accordance with the standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

# *Indian Standard*

# AEROSPACE — NUTS — TOLERANCES OF FORM AND POSITION

## 1 SCOPE

This standard specifies the tolerances of form and position for nuts used in aeronautical application.

## 2 REFERENCES

The following Indian Standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

| *IS No.* | *Title* |
|---|---|
| 8000 | Geometrical tolerancing on technical drawings: |
| (Part 1) : 1985 | Tolerances of form orientation, location and run-out and appropriate geometrical definitions (*first revision*) |
| (Part 2) : 1992 | Maximum material principles (*first revision*) |
| 8537 : 1977 | Nomenclature and terminology of fasteners |

## 3 CHARACTERISTICS

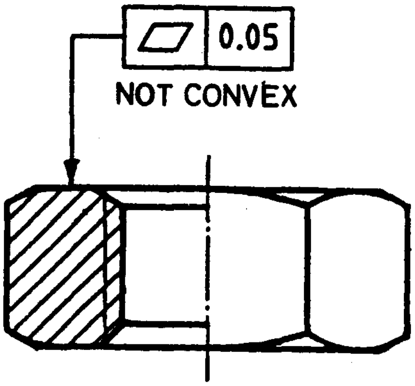
The different characteristics applicable for the types of nuts used are given in Tables 1 to 8. The figures indicate the illustration of tolerances of form and position.

## 4 DIMENSIONAL TOLERANCES

The dimensional tolerances have been given in Tables 9 and 10.

**Table 1 Flatness of Bearing Surface**

(*Clause* 3)

| **Type of Nut**<br>(1) | **Illustration**<br>(2) |
|---|---|
| Nut[1] with wrenching feature |  |

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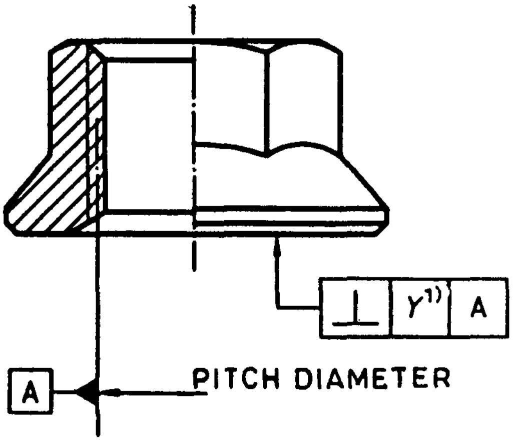
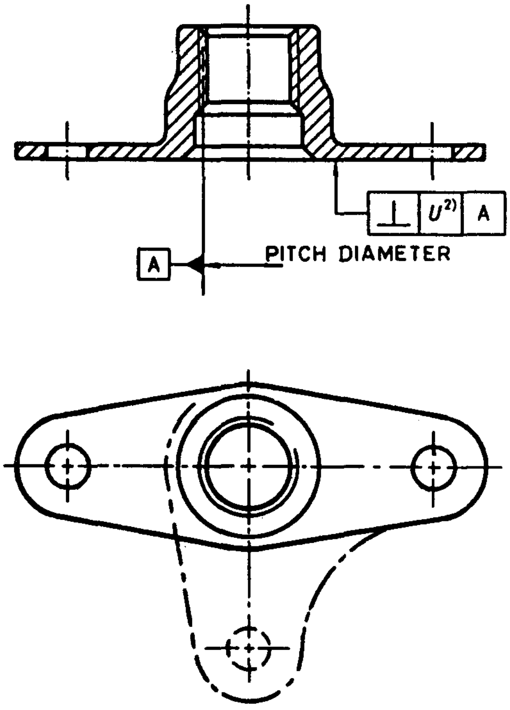
[1] The flatness tolerance applies to both faces of plain nuts.

## Table 2 Squareness of Bearing Surface

(*Clause* 3)

| Type of Nut<br>(1) | Illustration<br>(2) |
|---|---|
| Nuts with wrenching feature and clinch nuts for engine applications |  |
| Anchor nuts and clinch nuts for airframe applications |  |

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[1] *See* Table 10. The sequareness tolerance applies to both faces of plane nuts.

[2] Applicable over a diameter equal to *K* ( *see* Table 10). For floating anchor nuts and gang channels, this requirement applies to the floating element only, over a diameter equal to the width of this element.

## Table 3 Across Flats Symmetry

(*Clause* 3)

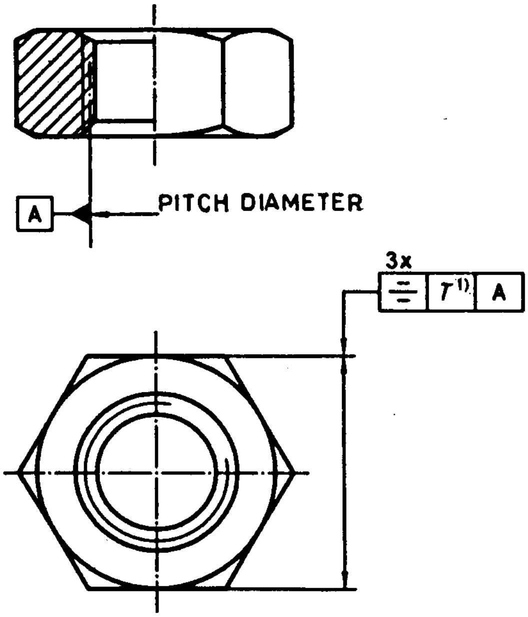
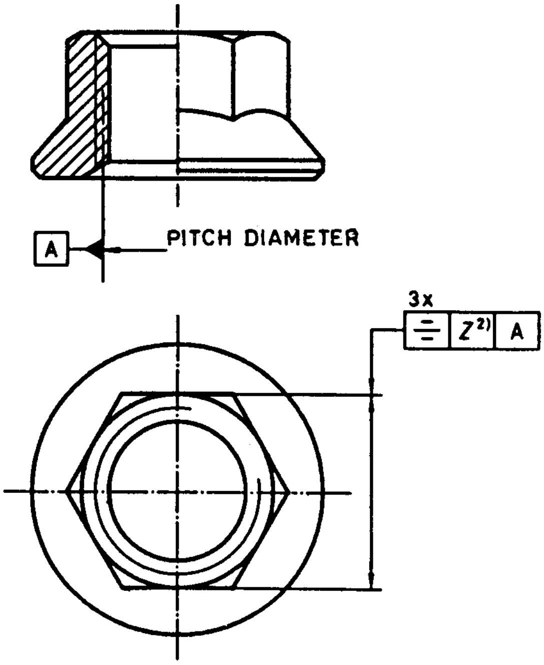
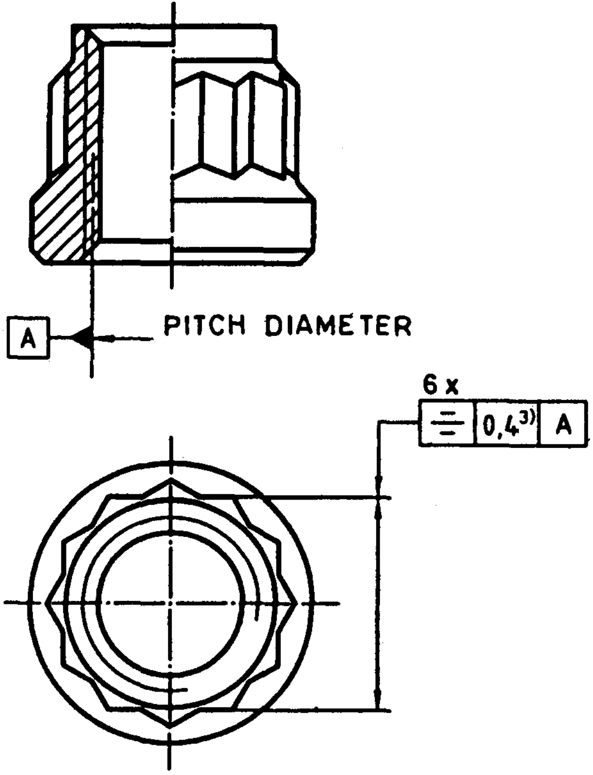
| **Type of Nut**<br>(1) | **Illustration**<br>(2) |
|---|---|
| Hexagonal nuts<br>— plain<br>— slotted<br>— with plastic locking ring |  |
| Self-locking hexagonal nuts formed out-of-round |  |

Table 3 — (*Concluded*)

| **Type of Nut**<br>(1) | **Illustration**<br>(2) |
|---|---|
| Bihexagonal nuts |  |

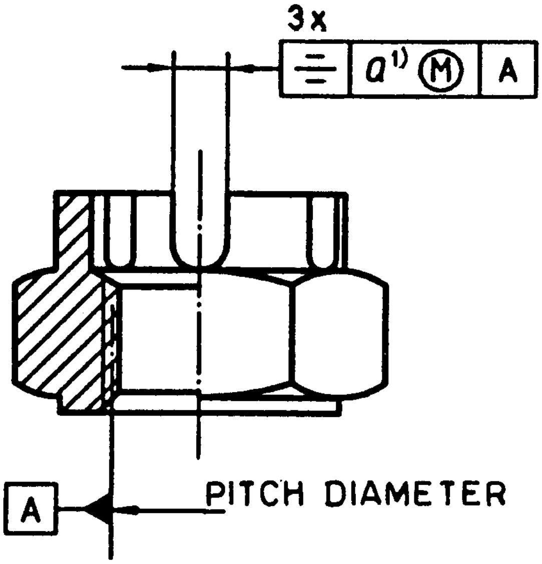
[1] *See* Table 9.

[2] *See* Table 10, values apply before forming out-of-round.

[3] Value applies before forming out-of-round.

## Table 4 Symmetry of Slots

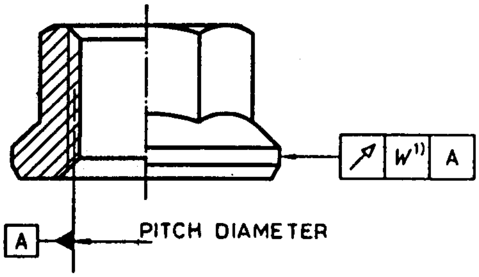
(*Clause* 3)

| **Type of Nut**<br>(1) | **Illustration**<br>(2) |
|---|---|
| Slotted nuts |  |

[1] *See* Table 9.

## Table 5 Flange Run-Out

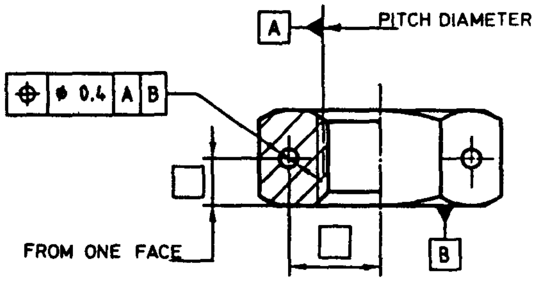
(*Clause* 3)

| **Type of Nut**<br>(1) | **Illustration**<br>(2) |
|---|---|
| Hexagonal and bihexagonal nuts |  |

[1] *See* Table 9.

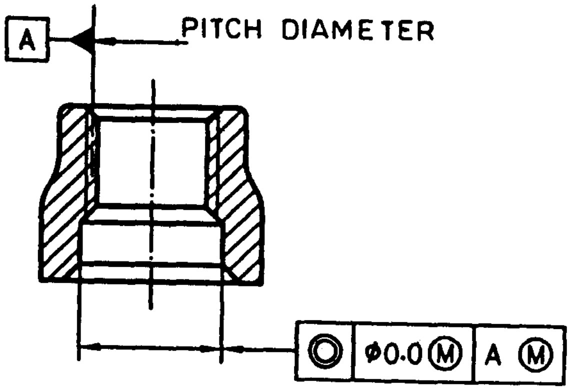
## Table 6 Locking Wire Hole Position

(*Clause* 3)

| Type of Nut (1) | Illustration (2) |
|---|---|
| Plain hexagonal nuts |  |

## Table 7 Counterbore Coaxiality

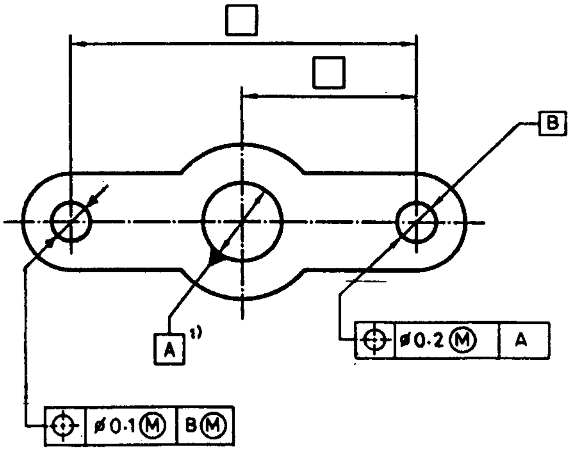
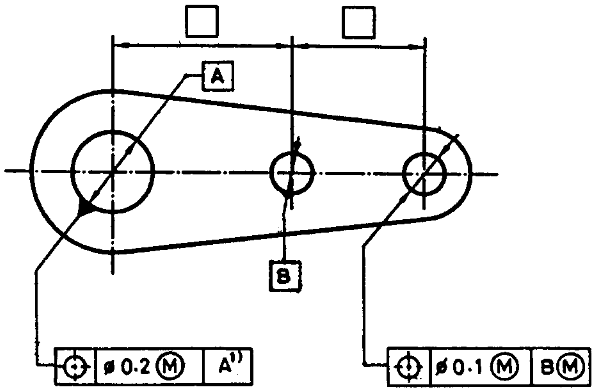
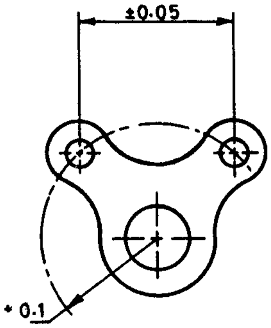
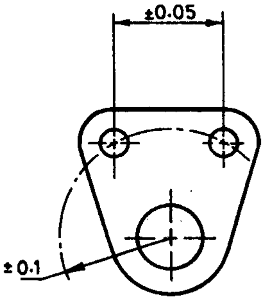
(*Clause* 3)

| Type of Nut (1) | Illustration (2) |
|---|---|
| Anchor nuts and nuts with wrenching feature |  |

## Table 8 Rivet Hole Position

(*Clause* 3)

All dimensions in millimetres.

| Type of Nut (1) | Illustration (2) |
|---|---|
| Two-lug anchor nuts |  |
| Single-lug anchor nuts with two holes |  |
| Corner anchor nuts |   |

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[1] For fixed anchor nuts, datum *A* is the thread pitch diameter; for floating anchor nuts, datum *A* is the hole diameter in the cage.

## Table 9 Tolerance Values Dependent on Nominal Thread Diameter

(*Clause* 4)

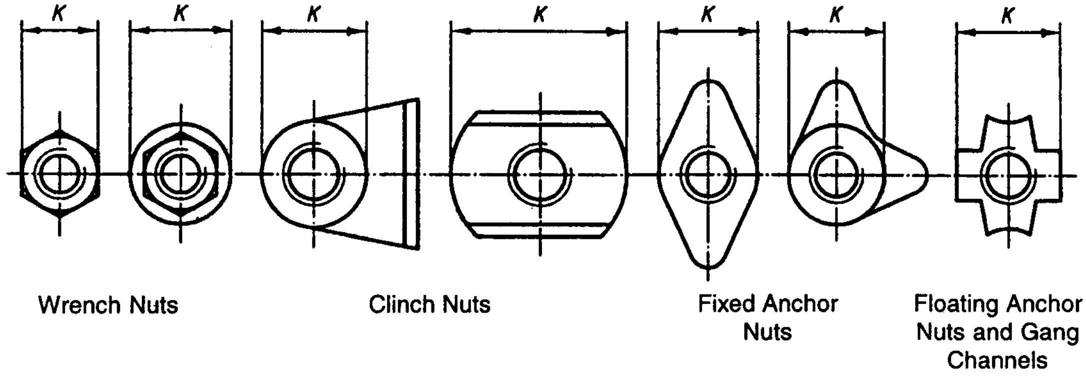
All dimensions in millimetres.

| Nominal Thread Diameter (1) | *T* (2) | *Q* (3) | *W* (4) |
|---|---|---|---|
| 2 | 0.25 | — | 0.2 |
| 2.5 | | — | |
| 3 | | — | |
| 4 | 0.3 | 0.2 | |
| 5 | | | |
| 6 | | | |
| 7 | 0.36 | | |
| 8 | | | |
| 10 | | 0.25 | 0.3 |
| 12 | 0.43 | | |
| 14 | | | |
| 16 | | 0.3 | |
| 18 | | | 0.4 |
| 20 | 0.52 | | |
| 22 | | | |
| 24 | | | |
| 27 | | – | |
| 30 | | – | |
| 33 | 0.62 | – | |
| 36 | | – | |
| 39 | | – | |

## Table 10 Tolerance Values Dependent on Reference Dimension *K*

(*Clause* 4)

All dimensions in millimetres.



| ***K*** (1) | ***U*** (2) | ***Y*** (3) | ***Z*** (4) |
|---|---|---|---|
| $K \le 5$ | 0.1 | 0.08 | 0.2 |
| $5 < K \le 7$ | 0.13 | 0.1 | |
| $7 < K \le 10$ | 0.15 | | |
| $10 < K \le 11$ | | | 0.4 |
| $11 < K \le 14$ | 0.18 | | |
| $14 < K \le 17$ | 0.2 | 0.13 | |
| $17 < K \le 20$ | 0.23 | | |
| $20 < K \le 23$ | 0.25 | 0.15 | |
| $23 < K \le 26$ | 0.28 | 0.18 | |
| $26 < K$ | 0.2 | | |

# ANNEX A

*(Foreword)*

## COMMITTEE COMPOSITION

### Aircraft and Space Vehicles Sectional Committee, TED 14

| *Organization* | *Representative(s)* |
|---|---|
| Directorate General of Aeronautical Quality Assurance (DGAQA), New Delhi | Shri M. V. Sundaram (***Chairman***)<br>Shri R. N. Sharma (*Alternate*) |
| Aeronautical Development Establishment (ADE), Bangalore | Shri Perduman Singh<br>Shri N. C. Sud (*Alternate*) |
| Aeronautical Development Agency (ADA), Bangalore | Shri S. C. Shrimali |
| Bharat Dynamics Ltd, Hyderabad | Shri R. N. Desai |
| Centre for Military Airworthiness and Certification (CEMILAC), Bangalore | Dr K. V. Murali<br>Shri V. K. Kalyanam (*Alternate*) |
| Directorate General of Civil Aviation, New Delhi | Shri B. K. Joshi<br>Shri N. S. Mundey (*Alternate*) |
| Hindustan Aeronautic Ltd, Bangalore | Shri S. K. Veluswami<br>Shri S. Ramakrishnan (*Alternate*) |
| Hindustan Aeronautical Ltd, Lucknow | Shri Milan Kumar Basu<br>Shri D. R. Arora (*Alternate*) |
| Indian Airlines, New Delhi | Shri Raman Chopra |
| Indian Institute of Science, Bangalore | Prof T. S. Ramamurthy |
| National Aeronautical Laboratory (CSIR), Bangalore | Shri J. P. Singh<br>Dr T. S. Balasubramanium (*Alternate*) |
| Research & Development Organization Reasearch Centre Imarat, Hyderabad | Dr Rajendra Prasad |
| Space Application Centre (ISRO), Department of Space, Ahmedabad | Shri Vijay Kumar |
| Vikram Sarabhai Space Centre, Thiruvananthapuram | Shri S. V. Sharma |
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Deputy Director (TED), BIS

### Accessories, Fasteners and Other Structural Items for Aircraft and Space Vehicles Subcommittee, TED 14 : 2

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| Bharat Dynamics Ltd, Hyderabad | Shri R. N. Desai |
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